



Student Booklet

Pre-Assessment.

On May 20, 1996, television, radio stations, and newspapers in the Baltimore area announced a “Code Orange” air quality alert! The “Code Orange Alert” was issued by the Maryland Department of Environment. What does the alert mean? Are we supposed to stop breathing? The Maryland Department of Environment is that part of state government responsible for ensuring that the physical environment of our state is clean and healthy for Maryland citizens.

In this task, you will learn about air quality, air quality alerts and ozone levels, then make a decision regarding what you can do to improve air quality in Maryland.

Think about where you live and the quality of the air you breathe. Work with a partner to write four questions about air quality that you would ask of a scientist from Maryland Department of Environment.

1. _____

2. _____

3. _____

4. _____

Resource A

Maryland Department of Environment
Press Release for Maryland School Children

May 1996

Summer Ozone Warnings Get A Color Scheme

Ozone is a major air pollution problem in Maryland. Maryland citizens suffer from more days of unhealthy amounts of ozone in our air than any other state in the eastern United States. The federal government's Clean Air Act requires the Baltimore area to reduce air pollution by a large amount by the year 2005. Air pollution controls on car exhaust, and on businesses and industries, are helping reduce ozone. While there were fewer ozone alerts in 1995 than there were in 1980, the problem continues and may again be growing as the state's population grows and the number of cars on the road increases. Ozone is a bigger problem in the more heavily populated areas of Maryland. Air sampling stations, many located at public schools, have been set up in the Baltimore region to check air quality. They sample ozone levels around the clock. Ozone is a colorless gas that is the main component of smog and it poses a health hazard. It can make colds worse, cause coughing and sore throats, and damage people's lungs and hearts. The Maryland Department of Environment created a chart to help citizens understand the ozone problem and the dangers to citizens' health. The chart lists some actions that can be taken to limit health related problems. "Code Red Alert," and other ozone warnings are often announced on TV and in newspapers. The Maryland Department of Environment operates an ozone information and action hotline at 800-539-6656, to answer citizen's questions.

NEW OZONE POLLUTION WARNING SYSTEM		
Air quality index code (AQI)	Weather conditions	Recommended actions
CODE RED Unhealthful AQI: 100 or more	Hot, hazy, humid; stagnant air; little chance of rain	Children, elderly and people with heart or respiratory ailments should limit outdoor activities; limit driving; fuel cars after dusk.
CODE ORANGE Approaching unhealthful AQI: 89-99	Temperatures in upper 80s to low 90s; sunny	Avoid using gas-powered lawn mowers, fuel cars at night; use well-maintained vehicles.
CODE YELLOW Moderate AQI: 51-88	Upper 70s to mid- 80s; light to moderate wind	Consolidate vehicle trips; limit idling; set air conditioners to 78 degrees.
CODE GREEN Good AQI: 0-50	Mild temperatures; wind, rain or cool front through area	Use car pools or public transit; tune cars and boats; use safe paints and cleaners

Resource B

Levels of Ozone During July 1995

Site: Padonia Elementary School
Ozone Measured in Parts Per Billion (PPB)

		Hour of Day											
Day	Midnight	Noon											
		12:00	2:00	4:00	6:00	8:00	10:00	12:00	2:00	4:00	6:00	8:00	10:00
Sat.	1	5	7	6	3	12	40	65	66	43	37	17	17
Sun.	2	15	30	23	21	31	33	49	57	55	45	13	5
Mon.	3	6	18	9	7	28	38	52	61	67	67	53	16
Tues.	4	6	0	1	23	29	38	56	48	31	38	33	24
Wed.	5	20	23	15	8	19	36	57	--	44	11	33	34
Thur.	6	40	34	31	18	19	42	54	48	24	5	0	0
Fri.	7	3	3	1	0	0	15	44	59	56	43	39	39
	8	28	21	9	8	46	61	62	58	48	37	25	21
	9	17	16	12	11	23	25	31	36	40	42	15	5
	10	0	0	5	0	18	53	65	79	63	62	43	44
DAY	11	49	40	10	9	28	50	65	55	63	50	26	5
OF	12	46	7	0	21	29	70	87	88	93	108	66	32
MONTH	13	28	30	25	37	41	72	99	112	128	104	60	30
	14	34	33	30	54	52	80	88	92	96	86	67	61

Continued on following page.

Resource B: Levels of Ozone During July 1995 (Continued)

	Hour of Day											
	Midnight	Noon										
	12:00	2:00	4:00	6:00	8:00	10:00	12:00	2:00	4:00	6:00	8:00	10:00
15	51	41	39	37	73	92	99	100	118	94	58	57
16	71	50	55	54	58	65	87	94	84	69	39	49
17	43	37	32	14	23	59	104	124	121	74	42	29
18	29	21	17	10	36	59	70	70	72	60	36	19
19	25	27	29	10	48	58	67	64	64	53	25	8
20	4	6	1	3	19	68	99	85	80	64	17	11
21	6	12	2	3	29	62	83	91	78	66	34	9
22	7	9	5	14	52	82	96	71	82	70	46	14
23	9	4	13	36	38	54	73	70	66	54	19	14
24	14	6	3	3	41	58	88	81	58	42	17	4
25	2	1	1	3	26	59	72	97	89	51	45	33
26	33	34	17	13	36	63	63	66	72	61	43	48
27	37	50	16	9	18	67	104	103	78	46	46	26
28	38	22	29	12	17	32	79	69	51	29	9	4
29	7	10	15	14	27	60	72	74	77	69	54	23
30	31	25	22	37	57	70	78	78	82	67	25	11
31	9	6	3	4	21	63	80	86	99	85	38	19
average	23	19	15	13	32	56	74	76	72	58	35	28
MAXIMUM	71	50	55	54	73	92	104	124	128	108	67	61

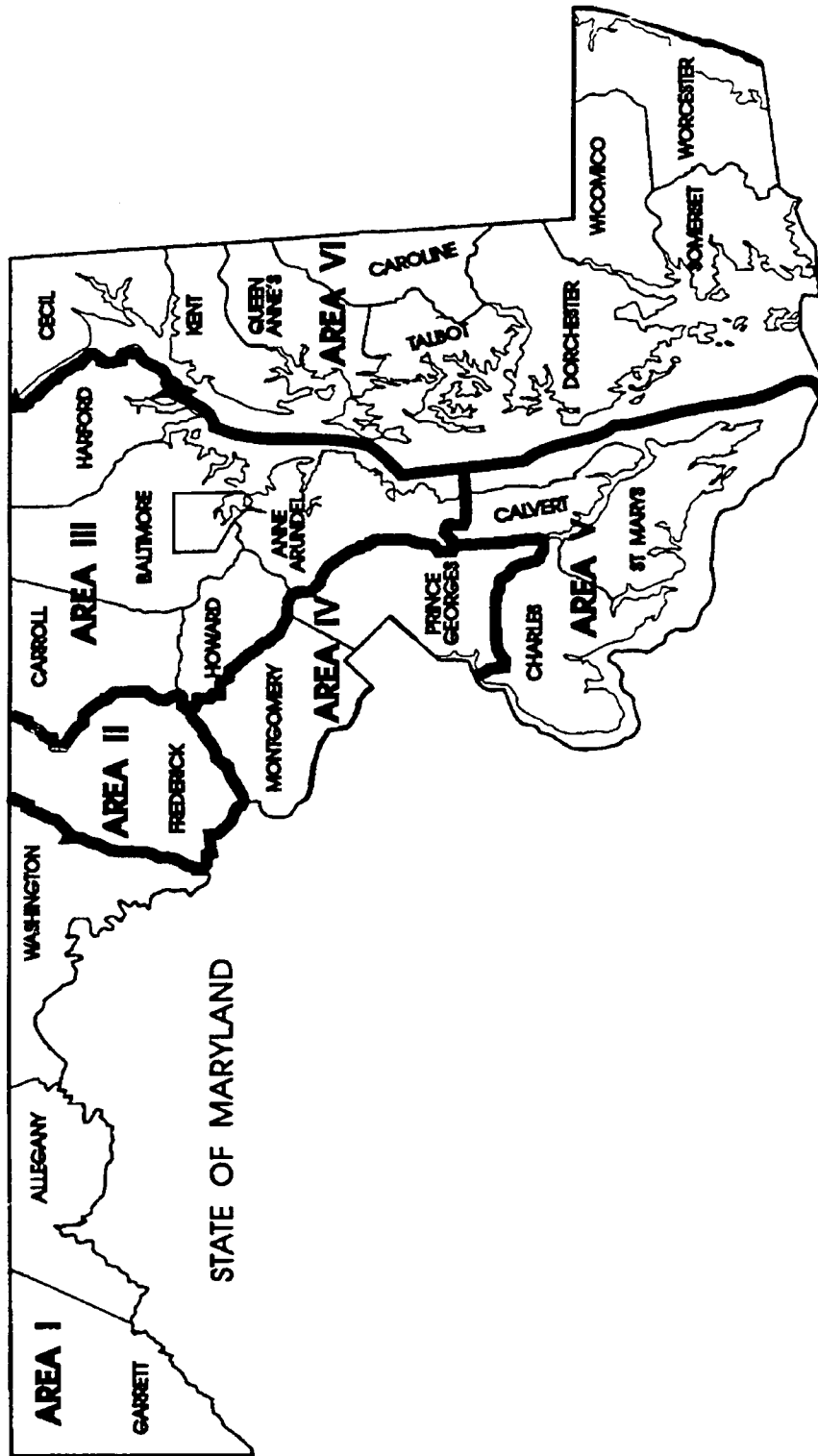
Resource C

Ozone Violation Days In Maryland

YEAR	AREA I	AREA II	AREA III	AREA IV	AREA V	AREA VI	STATE- WIDE
1980	0	1	41	17		8	44
1981	0	1	18	9		0	19
1982	0	0	15	4		0	15
1983	0	1	41	22		0	43
1984	1	0	17	7		0	18
1985	0	0	11	4	0	0	13
1986	0		13	5	0	0	17
1987	0		23	12	4	0	23
1988	1		36	21	11	0	36
1989	0		4	1	0	1	4
1990	0		10	3	0	1	11
1991	0		15	4	1	6	17
1992	0		3	0	1	1	5
1993	0		11	4	1	6	16
1994	0		10	3	0	0	11
1995			12	3	1	4	12

Through 8/2/95

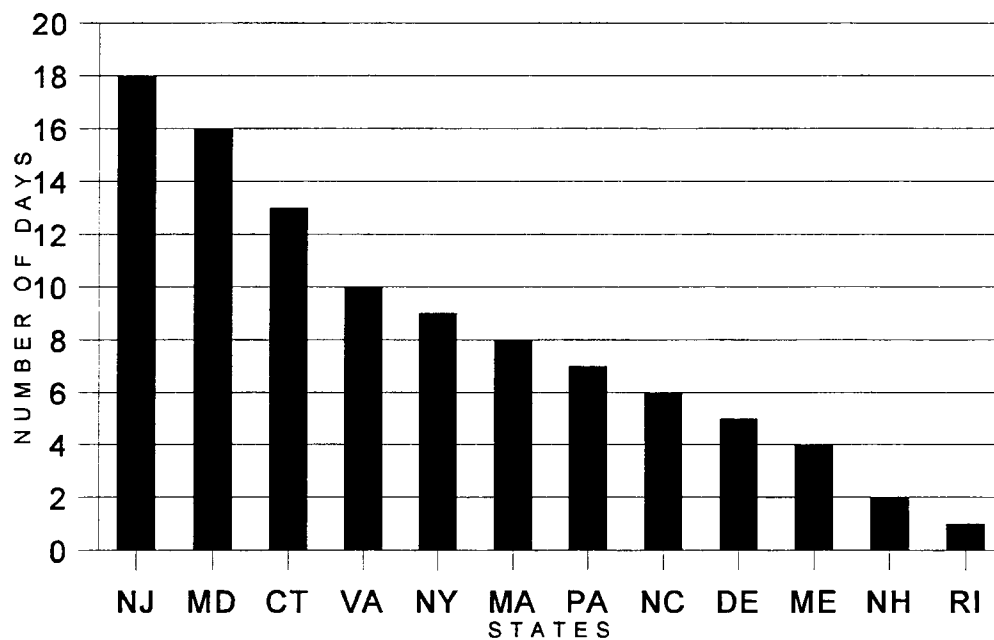
Resource C (Continued)



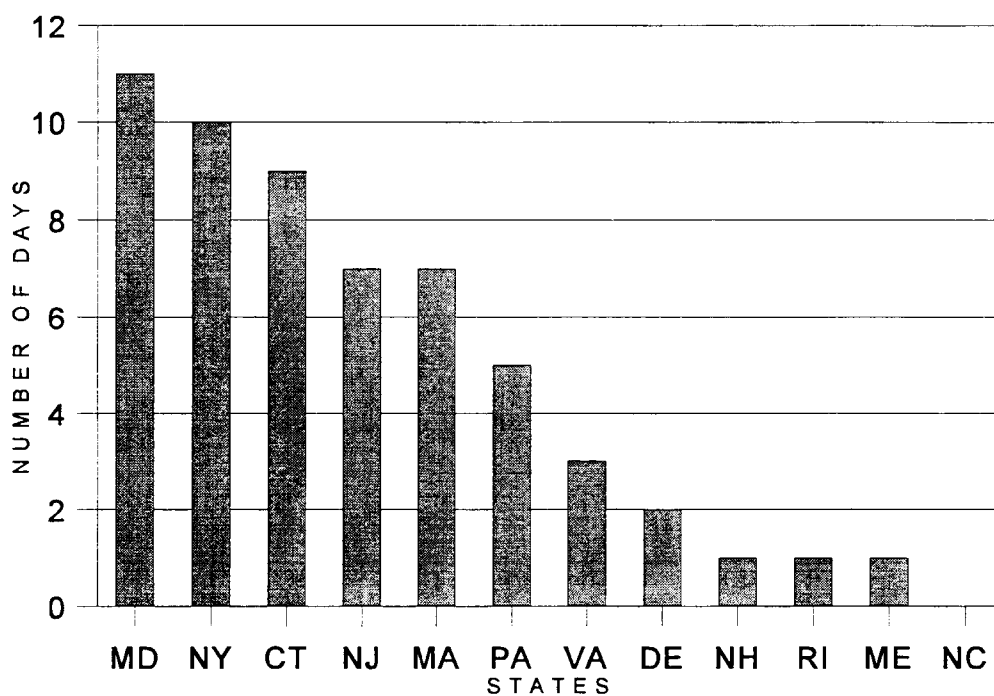
Resource D

EASTERN STATES EXCEEDING OZONE STANDARD

1993 Ozone Season



1994 Ozone Season



Activity 1.

Resource A is a May, 1996 Maryland Department of Environment press release titled **Summer Ozone Warnings Get a Color Scheme**. After reading the press release and studying the chart, answer the following questions.

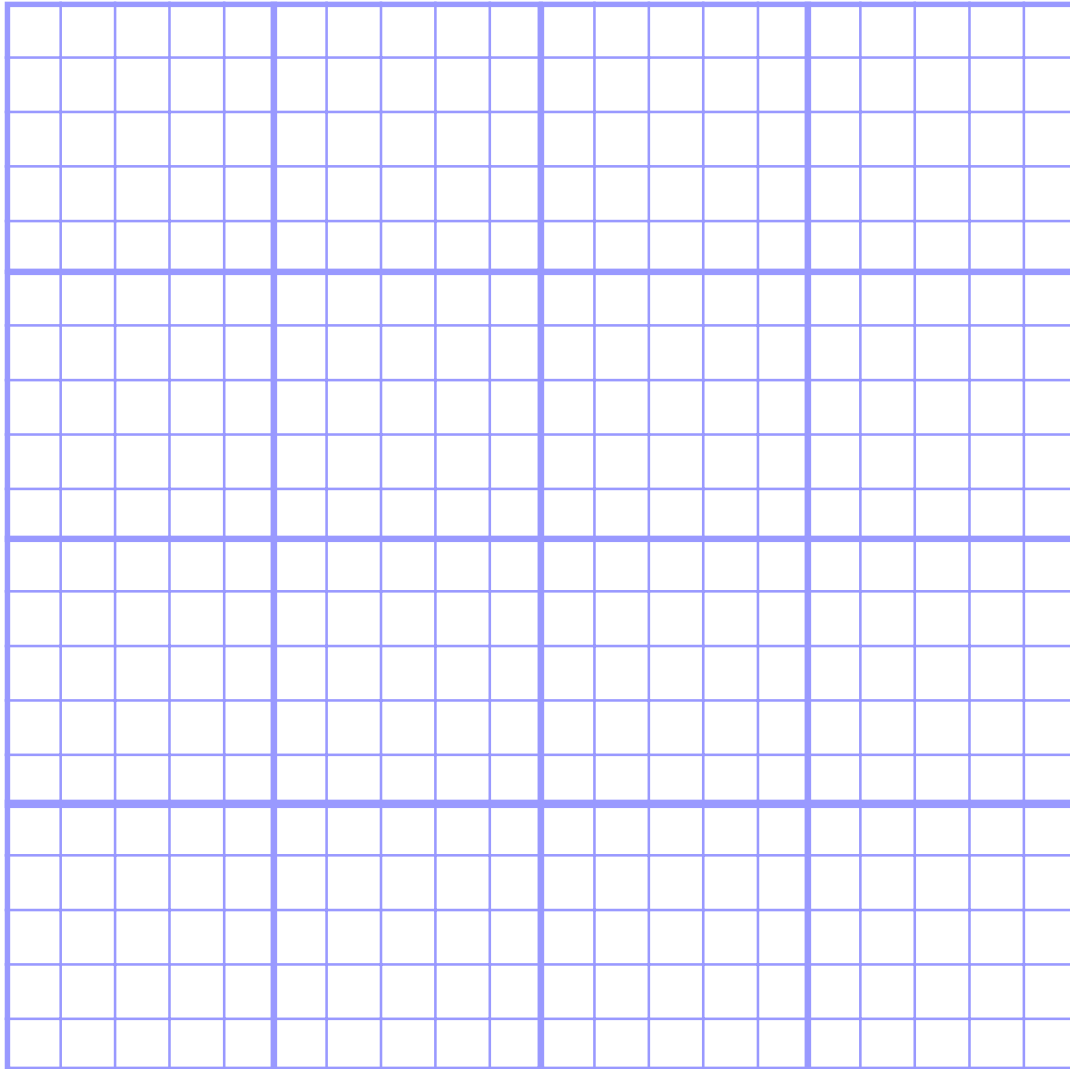
Step A. List five facts you learned from the press release that are important to you.

Step B. Explain how information in the press release might cause people to change their behavior.

Step C. The Maryland Department of Environment reports that almost all unhealthy air quality days, or Code Red Alerts, occur between May and September. Think about the characteristics of the seasons and then explain what makes May-September bad air quality months.

Activity 2.

Step A. Resource B is a chart, **Levels of Ozone During July 1995**. Data at the bottom of page 74 on the chart show the maximum ozone level recorded for each two hour period during July 1995. Make a line graph that shows how the maximum ozone level changes during the course of the day.



Step B. What time of day should you be most concerned about ozone levels? Support your answer with data from the graph.

Step C. Some researchers say that, on average, weekends will have lower ozone levels than weekdays. They think that this is so because fewer people are driving cars and because many businesses are closed on weekends.

Explain how information from the Chart, **Levels of Ozone During July 1995**, could be used to answer the question: Are ozone levels usually higher over the weekend or during the week?

Activity 3.

Resource C includes a chart and map from the Maryland Department of Environment. The chart shows the number of days in each year that a “Code Red Alert” was announced. The map shows the area or region of Maryland where this happened.

Step A. Which region of the state had the most violations? Support your answer with information from the chart.

Step B. Which region had the fewest violations? Support your answer with information from the chart.

Step C. Think about the many differences there are between the two regions you just identified. Explain how those differences would affect the number of ozone violations each year.

Step D. Many map elements are missing from the map in Resource C. Name three that you would include to help others better understand the connection between the chart and the map.

Step E. How do the divisions of the state into regions on this map differ from the divisions of the state into geographical regions that you have studied?

Activity 4.

Resource D is a chart, titled **Eastern States Exceeding Ozone Standard**, from data collected by the U.S. Environmental Protection Agency. It shows the number of days for which air quality exceeded the allowable standard.

Step A. Which of the two years was a better year for air quality? Support your answer with data from the chart.

Step B. Look at the 1994 ozone season. Think about geographic differences between a state with many days where ozone exceeded the healthy level and a state where it didn't. Identify the two states and list differences in the geography of the two states that might cause this to happen.

Activity 5.

In Activities 1-4 you studied charts, graphs, and press releases from the Maryland Department of Environment. Using that information and what you know, answer the following questions.

Step A. Describe the air quality problem in Maryland.

Step B. Is the air quality problem in Maryland getting better or worse? Include data to support your answer and reasons why.

[illegible]

Activity 6.

Earlier you learned that there was a “Code Orange Alert” on May 20, 1996. It is quite likely that there will be a “Code Red Alert” issued sometime this summer.

Step A. Based on what you know and what you have learned in this task, explain what you should do during a “Code Red Alert.”

Step B. It is always important to think about the consequences of your actions. If you do the things you listed in Step A, what might be the consequences for you and for other people?
